

Afterword

With the development of a mature institutional identity in the 1960s, cell biology joined the ranks of the biological disciplines. Although its roots were interdisciplinary, I have described how it developed into a distinct and enduring discipline. A critical element in this achievement was that it deployed new research techniques, especially cell fractionation and electron microscopy, which enabled its practitioners to explore mechanisms that were inaccessible to existing disciplines such as cytology and biochemistry. Using these tools the pioneers in cell biology, sometimes in collaboration with biochemists and molecular biologists, developed mechanistic explanations of numerous cell functions at multiple levels of organization. The discovery of these mechanisms, as described in Chapters 5 and 6, exemplifies the project of explaining phenomena mechanistically that I presented more abstractly in Chapter 2.

Cell biology, like any discipline, continues to develop and adjust its niche relative to other disciplines. It is most distinctive in (1) the attention it gives to variations in structure and function across cells from different organs and organisms; and (2) its status as an interdisciplinary nexus in which findings from physical, chemical, developmental, and other types of investigation are integrated toward an overall goal of understanding the cell. The emphasis given to different contributing disciplines has changed over time, however. In the 1950s and 1960s, collaborations with biochemists were of crucial importance. More recently, cell biology has drawn closer to molecular biology. In November 1989 the American Society for Cell Biology established a new journal, initially named *Cell Regulation*, whose mission statement provides a sense of how the scope of cell biology had grown and shifted toward molecular biology:

CELL REGULATION . . . publishes papers describing outstanding research contributions in molecular cell biology. The scope of the journal covers a broad

range of topics including all aspects of cell regulation and the reception, transduction, and integration of information. CELL REGULATION deals with the molecular biology and physiology of receptors, transducing systems, informational molecules, and their relevance to the growth, development, and physiology of prokaryotic and eukaryotic cells.

In 1992 the journal changed its name to *Molecular Biology of the Cell* and broadened its focus to include “original research concerning the molecular aspects of cell structure and function.”

Although more focused on processes at the molecular level, today’s cell biologists continue the program of explaining cell phenomena by discovering the responsible mechanisms. The pioneers in the period 1940–70 established this agenda and created the initial means of achieving it. Their story not only provides historical perspective on contemporary cell biology but also provides an instructive exemplar of how new disciplines emerge in the domains between existing disciplines. Even more, it provides the foundation for more generally rethinking fundamental issues in philosophy of science. Cell biology in the period I have examined did not advance any new scientific laws, traditionally thought to be the prime measure of success in science. Yet it extended scientific knowledge by advancing explanations of previously inexplicable phenomena. These explanations are of a type that is finally being recognized as ubiquitous in the biological (and many other) sciences: the articulation of mechanisms that account for phenomena. Working with other philosophers of science to turn our own field in a direction that can give adequate attention to this crucial type of explanation, I have returned time and time again to cell biology as a wellspring of insight into the true nature of biological science. The revolution that created cell biology half a century ago is now providing fuel for another revolution – one that promises to reenergize philosophy of science by relating it to the actual enterprise of biology.